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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/774,527	02/10/2004	Young Joon Ko	P-0657	1101
34610	7590	01/26/2006	EXAMINER	
FLESHNER & KIM, LLP P.O. BOX 221200 CHANTILLY, VA 20153			DUONG, KHANH B	
			ART UNIT	PAPER NUMBER
			2822	

DATE MAILED: 01/26/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/774,527	<b>Applicant(s)</b> KO ET AL.	
	<b>Examiner</b> Khanh B. Duong	<b>Art Unit</b> 2822	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 20 October 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 16-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 February 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>7/21/04</u> . | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Election/Restrictions***

Applicant's election with traverse of Group I (claims 1-15) in the reply filed on October 20, 2005 is acknowledged. The traversal is on the ground(s) that “the subject matter of each of the designated inventions is sufficiently related that a thorough search for the subject matter of each of the designated inventions would encompass a search for the subject matter of the remaining designated inventions”. This is not found persuasive because Applicant has not specifically addressed the Examiner’s reason for the restriction requirement as provided in the previous office action. Furthermore, it is respectfully submitted that the search and examination of all disclosed inventions would be a serious burden.

The requirement is still deemed proper and is therefore made FINAL.

### ***Priority***

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### ***Specification***

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: MULTI-BIT PHASE SHIFTER COMPRISING MEMS SWITCH.

### ***Drawings***

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the limitation “an open stub

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connected to the short stub in parallel” must be shown or the feature(s) canceled from the claim(s). No new matter should be entered. Note: It appears that the drawing (e.g. FIG. 6A) is showing an open stub being connected to a short stub in series (not parallel) by a T-junction air bridge. However, it is clear that the drawing is showing the open stubs and the short stubs are “disposed” in parallel [see specification: paragraph 0075, lines 4-6].

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Objections***

Claim 1 is objected to because of the following informalities: line 4, before “MEMS”, “an” should be --a--.

Claim 2 is objected to because of the following informalities: line 2, after “short stub”, “in parallel” should be --in series-- [see FIG. 6A].

Appropriate corrections are required.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

**Claims 1-15 are rejected under 35 U.S.C. 102(b) as being anticipated by Ko et al. (“Integrated Five-Bit RF MEMS Phase Shifter for Satellite Broadcasting/Communication Systems”, Vol. CONF. 16, January 19, 2003, pages 144-148, XP010636930).**

Re claim 1, Ko et al. (“Ko”), cited by Applicant in IDS, discloses in Figure 11 a multi-bit phase shifter [see accompanying texts: pages 144-148] comprises: one or more phase shifters each including a short stub with an end short; and a MEMS (Micro Electro Mechanical System) switch formed at the short stub and controlling an impedance value.

Re claim 2, Ko expressly discloses in Fig. 11 an open stub connected to the short stub in parallel inherently to obtain a wider bandwidth and smoothing phase characteristics; and a DC bias line for lowering a driving voltage of the MEMS switch [see pages 147; left column, 1<sup>st</sup> paragraph].

Re claim 3, Ko expressly discloses in Figure 4 the multi-bit phase shifter further comprising: an air gap coupler inherently for maintaining a stable phase difference on a line.

Re claim 4, Ko discloses the phase shifter generates a phase difference by a multiple of  $11.25^\circ$  [see pages 147; left column, 1<sup>st</sup> paragraph].

Re claim 5, Ko discloses the phase shifter is  $11.25^\circ/22.5^\circ/45^\circ/180^\circ/90^\circ$  phase shifters [see pages 147; left column, 1<sup>st</sup> paragraph].

Re claim 6, Ko expressly discloses in Figure 11 the  $11.25^\circ/22.5^\circ/45^\circ$  phase shifters include a stub with an end short, instead of an inductor or a capacitor, and loads the MEMS switch at the end of the stub to use a phase difference of a reflected wave according to a capacitor on-off ratio.

Re claim 7, Ko discloses the  $180^\circ/90^\circ$  phase shifters are reflection type phase shifters using a coupler [see pages 147; left column, 1<sup>st</sup> paragraph].

Re claim 8, Ko expressly discloses in Figure 11 an air bridge for forming a common ground among grounds of the phase shifters.

Re claim 9, Ko expressly discloses in Figure 11 a multi-bit phase shifter [see pages 144-148; left column, 1<sup>st</sup> paragraph] comprising: a first phase shifter including a short stub with an end short, an open stub for smoothing phase characteristics, an MEMS (Micro Electro Mechanical System) switch formed at the end of the short stub and controlling an impedance value, and a DC bias line for lowering a driving voltage of the MEMS switch; and a second phase shifter including a short stub with an end short, an MEMS switch formed at the end of the short stub and controlling an impedance value, and a DC bias line for lowering a driving voltage of the MEMS switch.

Re claim 10, Ko expressly discloses in Figure 11 one or more first phase shifters are connected to generate a phase difference by a multiple of  $11.25^\circ$ .

Re claim 11, Ko expressly discloses in Figure 11 the second phase shifter generates a phase difference by a multiple of  $90^\circ$  by controlling the MEMS switches.

Re claim 12, Ko expressly discloses in Figure 4 the second phase shifter further includes an air gap coupler for maintaining a stable phase difference among the short stubs.

Re claim 13, Ko expressly discloses in Figure 11 the open stub is connected in parallel to the short stub in order to secure a wide bandwidth.

Re claim 14, Ko expressly discloses in Figure 11 an air bridge for forming a common ground between grounds of the first phase shifter and the second phase shifter.

Re claim 15, Ko expressly discloses in Figure 11 the phase shifter includes a 5-bit phase shifter including a  $11.25^\circ$  phase shifter having one first phase shifter, a  $22.5^\circ$  phase shifter having two first phase shifters, a  $45^\circ$  phase shifter having two first phase shifters, a  $90^\circ$  phase shifter having the second phase shifter, and a  $180^\circ$  phase shifter having the second phase shifter.

### ***Conclusion***


The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following U.S. patents disclose relevant teachings regarding multi-bit phase shifters comprising the use of MEMS switches: Allison '207, McGrath '889 and Dipiazza '294.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khanh B. Duong whose telephone number is (571) 272-1836. The examiner can normally be reached on 10:00-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra Smith, can be reached on (571) 272-2429. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



KBD



Zandra V. Smith  
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23 Jan 2006